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GUIDELINES FOR THE
DECOMMISSIONING AND CLEANUP
OF SITES IN ONTARIO

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GUIDELINES FOR THE
DECOMMISSIONING AND CLEANUP
OF SITES IN ONTARIO

Report prepared by:

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Ontario Ministry of the Environment

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TABLE OF CONTENTS

	<u>Page No.</u>
1. Introduction	1
2. Definitions	1
3. Purpose	1
4. Scope, Application and Notification	1
4.1 Scope	1
4.2 Application	2
4.3 Notification	2
5. Legislative Context to Decommissioning and Site Clean-Up.....	3
5.1 Environmental Legislation	3
5.2 Other Legislation	3
6. Environmental Components of a Decommissioning or Site Clean-up Program.	4
6.1 General	4
6.2 Timing	4
7. Phase I Activities	4
7.1 Corporate Commitment	5
7.2 Initial Documentation	5
7.3 Public Communications and Consultation	5
7.4 Preliminary Inventory	6
7.5 Level of Clean-Up	6
7.5.1 Determination of Background Levels	7
7.5.2 Development of Clean-Up Criteria Above Background Levels	7
7.5.2.1 MOE Contaminant Policies, Guidelines and Requirements ...	8
7.5.2.2 Clean-Up Criteria Developed In Other Jurisdictions	8
7.5.2.3 Site Specific Clean- Up Criteria	9
7.5.3 Proposed Future Land-Use	10
7.5.4 Application of Clean-Up Criteria	11
7.5.5 Criteria and Background Level Review and Public Consultation	11

8.	Phase II Activities	12
8.1	Design of Remedial Work Program	12
8.1.1	Sampling Program	12
8.1.2	Remedial Work Plan	12
8.1.3	Selection of Remedial Action Technology	14
8.1.4	Remedial Work Plan Approvals and Financial Assurance	14
8.1.5	Remedial Work Plan Review	14
8.2	Implementation of Remedial Work Program	15
8.2.1	Communication with Site	15
8.2.2	Operation of Equipment and Processes	15
8.2.3	Removal of On-Site Facilities	15
9.	Phase III Activities	16
9.1	Verification	16
9.2	On-Going Monitoring	16
9.3	Communication of Completed Decommissioning	17
10.	Phase IV Activities	17
10.1	Registration of Decommissioning or Site Clean-Up	17
10.2	Statement of Completion of Decommissioning or Site Clean-Up ...	18
10.3	Future Land Uses	18
Appendix A	MOE Criteria Guidelines to be Used in Decommissioning or Cleaning-Up Sites in Ontario	
Appendix B	Approaches to Sampling	
Appendix C	Selected Provincial Environmental Legislation Relevant to Decommissioning and Site Clean-Up	

1. Introduction

These Guidelines have been prepared to provide for an efficient and effective process to decommission facilities and clean-up the environment. The Guidelines detail a process for meeting MOE requirements and outline management and technical procedures in this regard. Experience from one decommissioning or clean-up will be applied to subsequent decommissionings and clean-ups. Where possible, points in the decommissioning and site clean-up process have been identified at which public consultation requirements and the requirements of other agencies may need to be met.

2. Definitions

Throughout this document, the terms "decommission" and "decommissioning" are used to mean the mothballing, partial closure or complete closure of facilities.

The term "clean-up" means the restoration of a contaminated site to ensure the protection of human health and the environment. The decommissioning of facilities may or may not be associated with site clean-up.

3. Purpose

The purpose of these Guidelines is to:

- 1) ensure that the decommissioning and clean-up of sites is completed in an environmentally acceptable manner;
- 2) communicate to decommissioning and site clean-up proponents and the public the requirements and policies of the Ministry of the Environment (MOE) and identify potential involvement of other agencies;
- 3) ensure that the decommissioning and clean-up of sites in Ontario proceeds in as efficient, fair and consistent a manner as possible; and
- 4) ensure public involvement in the decommissioning and site clean-up process.

4. Scope, Application and Notification

4.1 Scope

There are three types of decommissioning: mothballing, partial dismantling and complete dismantling. These Guidelines should be used under any of these scenarios. Facility abandonment is not an acceptable alternative.

These Guidelines may also be used, as appropriate, where remedial action may be necessary to clean-up a site but where the decommissioning of facilities is not being undertaken or is complete, e.g., remedial actions taken with respect to contaminants at coal gasification and other historically contaminated sites.

In addition, the Guidelines may also be used when industrial and other sites are offered for sale, even if a decommissioning is not involved. Prospective purchasers may use the Guidelines to assist in minimizing their risk of assuming environmental liabilities when they purchase a site.

4.2 Application

The Guidelines can apply to all provincially, municipally and privately owned sites and facilities to be closed down at which environmental contamination may have taken place. This includes industrial facilities, transportation facilities and institutions such as hospitals and laboratories. The Guidelines include the broad range of activities that may be required to decommission or clean-up a site. However, not all decommissionings or site clean-ups need necessarily involve all the tasks outlined in this document.

These Guidelines do not apply to waste disposal site closure or to the closure of other facilities that are required to meet either closure conditions in fulfilment of a MOE certificate of approval or terms and conditions attached to an Environmental Assessment Act Exemption Order, except to the extent the Guidelines are made applicable by an order or approval. Federal standards and requirements will normally apply to facilities that are decommissioned on federal property. Where there are federal and Ontario decommissioning or site clean-up guidelines/standards, the more stringent should apply in decommissioning or cleaning-up these facilities.

4.3 Notification

MOE may become aware of plant decommissionings in two ways. Under the Employment Standards Act, companies are required to inform the Ministry of Labour (MOL) of all employment terminations involving 50 or more employees. MOL has agreed to routinely make this information available to the Waste Management Branch of MOE. Where such employment terminations are a result of plant closures, Waste Management Branch will notify the appropriate Regional

Office. Alternatively, Regional staff may become aware of decommissionings that do not involve employment terminations requiring reporting to MOL.

5. Legislative Context To Decommissioning and Site Clean-Up

5.1 Environmental Legislation

The environmental concerns associated with decommissioning and site clean-up should be addressed through the Environmental Protection Act (EPA), Environmental Assessment Act (EAA) and the Ontario Water Resources Act (OWRA). As a matter of policy, MOE staff should use EPA provisions such as Section 17 to issue orders to enforce the decommissioning or site clean-up process when proponents are unwilling to meet MOE decommissioning or site clean-up objectives or timeframes.

Two Regulations issued under the EPA are also relevant: Regulation 308 details requirements related to the emission of contaminants to the atmosphere; Regulation 309 regulates waste management in general.

Appendix C summarizes the relevant provincial environmental legislation and Regulations, administered by MOE, that are most commonly applicable to decommissioning and site clean-up. Projects and plans subject to the Environmental Assessment Act must address decommissioning as part of the environmental assessment process.

In addition to provincial legislation, environmentally-related municipal by-laws may also apply. In particular, relevant by-laws are likely to regulate discharges to storm and sanitary sewers, and noise from construction activity. There may also be other by-laws that bear on decommissioning or site clean-up in any particular municipality. Conservation Authorities and federal agencies may have requirements to be met.

5.2 Other Legislation

Other provincial, municipal and federal legislation may also apply to a site decommissioning or clean-up. These requirements may pertain to planning, public notice, protection of environmentally sensitive areas, posting by Ministry of Health, occupational health and safety, or the size of vehicles on city streets, for example.

6. Environmental Components of a Decommissioning or Site Clean-Up Program

6.1 General

Decommissioning and site clean-up should be conducted according to a planned process comprised of separate phases. Each phase has objectives, which are met by completing individual tasks and activities. Decommissionings and site clean-ups typically have the following phases:

- Phase I - Planning the Decommissioning/
Site Clean-Up
- Phase II - Designing and Implementing the
Decommissioning/Site Clean-Up
- Phase III - Verifying Completion of a
Satisfactory Decommissioning/
Site Clean-Up
- Phase IV - Signing off

MOE district offices will take the MOE lead role in liaising with decommissioning and site clean-up proponents. MOE Waste Management Branch will provide technical and policy assistance to district offices. Communication should be established with MOE district offices as early as possible in the decommissioning or site clean-up process and maintained until a satisfactory decommissioning or site clean-up has been verified. All data relevant to the decommissioning or site clean-up should be reviewed by MOE on an ongoing basis. For decommissioning or site clean-ups with many components, regular progress reports will be required by MOE. Other concerned parties, including the public, should be consulted regarding the decommissioning or site clean-up as it proceeds.

6.2 Timing

Proponents of a decommissioning or site clean-up should establish a timing schedule that accommodates all environmental requirements of the decommissioning or site clean-up. The timing schedule must anticipate reviews and revisions of decommissioning or site clean-up requirements as the decommissioning or site clean-up proceeds and should be sufficiently flexible to accommodate unexpected problems.

7. Phase I Activities

Phase I involves the planning of the decommissioning or site clean-up. Four major tasks should be undertaken.

7.1 Corporate Commitment

A corporate commitment to complete the decommissioning or site clean-up in an environmentally acceptable manner may be demonstrated by a directive issued by the company president or the executive responsible for administering the decommissioning or site clean-up. This approach is effective in communicating to government agencies and the public, as well as corporate personnel, the commitment to fully resolve all environmental issues related to the decommissioning or site clean-up.

7.2 Initial Documentation

Initial documentation of the site to be decommissioned or cleaned-up should be forwarded to the local MOE office, other government agencies, such as the Ministry of Labour, and the municipality. Initial information submitted to MOE regarding the decommissioning or site clean-up should include: a general description of the facilities to be decommissioned; a site plan to scale, also showing surrounding land uses and natural features; the approximate time frame envisaged for the decommissioning or site clean-up; and the current official plan designation and zoning of the site. Any proposed changes to the official plan designation or zoning by-laws should also be included.

MOE and other agencies can assist in initial decommissioning or site clean-up planning by providing information on decommissioning or site clean-up requirements, interpretation of applicable legislation and specific issues to be addressed.

7.3 Public Communications and Consultation

Proper communication of decommissioning or site clean-up activities to appropriate citizens' groups, public interest and environmental groups and the media is an essential component of decommissioning and site clean-up activities. Therefore, a public communications strategy which includes public consultation should be developed by the proponent and reviewed with MOE. A publicly available file should be created, containing records of all significant decisions taken with respect to milestones, deadlines, levels of contamination, proposed remedial actions, verification and confirmation of site clean-up and other aspects of a decommissioning. To facilitate public consulta-

tion, consideration should be given to establishing a public liaison committee comprised of representatives from all agencies participating in the decommissioning or site clean-up and the public.

A well planned, comprehensive communications and public consultation strategy will result in an informed public, which will facilitate the decommissioning and site clean-up process.

7.4 Preliminary Inventory

At facilities to be decommissioned, a preliminary inventory of potential contaminants and contaminant sites should be drawn up. This will identify if clean-up is required and will provide an initial understanding of the range and quantity of contaminants and contaminated materials likely to be found on-site.

There are a number of sources for obtaining preliminary contaminant information. Historical records, such as archives and maps, should be reviewed to establish any previous land uses that may have caused contamination; inventory, production and process modification records should be checked and chemical raw materials and wastes identified; loading and unloading areas should be plotted; above ground and underground storage tanks and pipeline locations should be defined; and records of on-site waste disposal locations and spills should be noted. Discussions should be held with both past and present plant personnel regarding potential contaminant locations.

A preliminary sampling program to identify on-site soil contaminants should be undertaken at this point. Where appropriate, a preliminary sampling program of surface and ground water should also be undertaken. If contaminants that can migrate off-site or volatilize are suspected, the initial sampling program should be extended for verification.

7.5 Level of Clean-Up

In principle, remedial action will be required wherever contaminants are present at concentrations above ambient background levels. The development of clean-up criteria above background levels, however, may be undertaken by the proponent in accordance with the factors outlined in Section 7.5.2 and the land-use considerations described in Section 7.5.3.

7.5.1 Determination of Background Levels

"Background level" is defined as the ambient level of a contaminant in the local area. Determination of this level will generally require a sampling program. Where a wide range of contaminants are present on-site, it may be acceptable to select indicator contaminants to represent the range of contaminants at the site; in this case, background levels would be determined with respect to these contaminants only. Selection of indicator contaminants must be done in consultation with MOE.

In some situations, background levels of contaminants of concern may themselves be unacceptably elevated in the local area as a result of industrial or other activity. Where this is the case, background levels in soils can be defined according to the Upper Limits of Normal Concentrations in Soils data that have been developed by MOE for a variety of parameters (see Appendix A). Background levels in water should be defined according to the objectives outlined in "Water Management: Goals, Policies, Objectives and Implementation Procedures of the Ministry of the Environment" (see Appendix A).

If background levels of contaminants of concern are unacceptably elevated in the local area and appropriate data do not exist in the above sources, a sampling program should be undertaken to determine background levels of the contaminants of concern at a representative location outside the local area.

7.5.2 Development of Clean-Up Criteria Above Background Levels

Clean-up criteria above background levels may be developed provided that the criteria are protective of human health and the environment. There are three general approaches that may be taken to developing clean-up criteria above background levels:

- 1) application of relevant MOE policies, and guidelines;

- 2) application of clean-up criteria developed in other jurisdictions, where appropriate;
- 3) development and application of site specific clean-up criteria.

Where a wide range of contaminants are present on-site, it may be acceptable to develop clean-up criteria above background levels based on indicator contaminants that represent the range of contaminants at the site. Selection of indicator contaminants must be done in consultation with MOE.

7.5.2.1 MOE Contaminant Policies, Guidelines and Requirements

The Ministry of the Environment has developed:

- 1) clean-up guidelines for several contaminants in soils;
- 2) objectives for water quality and drinking water quality;
- 3) policies and guidelines related to resolving groundwater quality problems and the application of the reasonable use concept to groundwater management;
- 4) a regulation governing the emission of atmospheric contaminants.

These policies, guidelines and requirements are outlined in Appendix A and may be used, as appropriate, to assist in developing criteria levels above background levels. Clean-up guidelines for additional contaminants, particularly organics, will be included in Appendix A as they are developed or adopted for use in Ontario.

7.5.2.2 Clean-Up Criteria Developed In Other Jurisdictions

Where MOE contaminant criteria guidelines for the contaminants of concern are not available to assist in clean-up criteria development, it may be possible to

apply clean-up criteria developed in other jurisdictions. In order to apply clean-up criteria developed in other jurisdictions at a site in Ontario, the following factors should be taken into consideration:

- 1) the methods used to develop the criteria must be acceptable to MOE;
- 2) the proposed application of the criteria must be consistent with the application intended when the criteria were developed;
- 3) the criteria should be consistent with MOE's overall objective of establishing stringent criteria that are fully protective of human health and the environment.

It is the proponent's responsibility to provide the information necessary to allow MOE to make a decision regarding the acceptability of criteria developed in other jurisdictions at a site in Ontario. The application in Ontario of criteria developed in other jurisdictions will only be permitted where the application of the criteria is consistent with Ontario legislation, policies and guidelines.

7.5.2.3 Site Specific Clean-Up Criteria

Where MOE clean-up criteria guidelines have not been developed, or where acceptable criteria are not available from other jurisdictions, the development of site-specific clean-up criteria may be undertaken. This must take into consideration the following factors:

- 1) environmental and human health toxicology of the contaminants;
- 2) mobility of the contaminants of concern;
- 3) the pathways by which the contaminants of concern may impact on

human health or the environment, with respect to the anticipated future zoning of the site;

- 4) the combined effects of the contaminants of concern.
- 5) the physical features and environmental conditions of the site, including background concentrations of contaminants.

The development of site-specific criteria may be complex and MOE must therefore review each stage of the work required to develop the criteria. It is the proponent's responsibility to provide the information necessary to allow MOE to make a decision regarding the acceptability of proposed site-specific criteria.

7.5.3 Proposed Future Land-Use

If clean-up criteria above background levels are proposed, specific reference must be made to a future land-use of the site that is compatible with existing or proposed neighbouring land-uses. If an immediate future use has not been determined, one of the following generic uses will be assumed, consistent with the existing or proposed zoning of the site.

- 1) Agricultural
- 2) Residential
- 3) Parkland
- 4) Commercial
- 5) Industrial

Generally, more stringent clean-up criteria will be required for agricultural, residential and parkland redevelopment than for commercial or industrial redevelopment. Where clean-up criteria above background levels are developed on the basis of one type of site reuse, but zoning or official plan changes are proposed in the future that would permit other types of site reuse, MOE will recommend that the proposed changes not occur until the Ministry has

reviewed and determined the need for additional remedial measures at the site.

7.5.4 Application of Clean-Up Criteria

Clean-up criteria should be used to define areas of contamination requiring remedial action. If background levels are adopted as on-site clean-up criteria, remedial action will be required with respect to on-site contamination above background levels. If clean-up criteria above background levels are developed, remedial action will be required with respect to on-site contaminant levels in excess of the criteria. Aesthetic parameters, such as odour, must be addressed regardless of the clean-up criteria.

7.5.5 Criteria and Background Level Review and Public Consultation

While proponents should be encouraged to develop clean-up criteria or background levels in consultation with MOE and other agencies such as the Ministry of Health, local Medical Officer of Health, the Ministry of Labour and the municipality, this will not preclude the need for the criteria or background level definitions to undergo formal review by the above agencies once they are proposed for adoption.

Where appropriate, the public should also be able to review the proposed criteria or background level definitions, in conjunction with other Phase I work, prior to decisions being taken regarding the acceptability of criteria or background levels. A notice can be placed in all newspapers serving the community adjacent to the decommissioning or contaminated site announcing the availability of the proposed criteria or background level definitions and how they may be obtained.

A public comment period of at least 30 days from publication of the newspaper notice should be allowed prior to any decisions being made regarding the acceptability of the proposed criteria, background level definitions or remedial actions required. Where public meetings are held, a longer public review period may be necessary.

8. Phase II Activities

Phase II involves the design and implementation of a remedial work program.

8.1 Design of Remedial Work Program

The objectives of this task are to conduct an in-depth analysis of all on-site factors relating to the decommissioning or site clean-up and to develop an action plan to decommission and/or clean-up the site with these factors in mind.

8.1.1 Sampling Program

A comprehensive sampling program may be necessary to establish in detail the extent of contamination at the site. The sampling program should include detailed contaminant investigation of soils, groundwater and surface water, and atmospheric emissions, as appropriate to the site.

It may be necessary to extend the sampling program to add detail to the data gathered in Phase I on the physical features and environmental conditions of the site. The sampling program should also be extended to adjacent, off-site areas where there is a reasonable expectation that off-site contaminant migration may have occurred. A geomagnetic scan of the entire site should be made to locate any unknown buried drums or other containers that may contain contaminants. Appendix B provides information on sampling procedures acceptable to MOE.

If the sampling program reveals significant additional contaminants or other data to those identified during the preliminary inventory, this should be communicated to all parties and agencies involved in the decommissioning or site clean-up. Clean-up criteria should be modified, as appropriate, in consultation with the appropriate regulatory agencies and the public.

8.1.2 Remedial Work Plan

The remedial work plan will determine the measures necessary to clean-up or control all areas of contamination in excess of the clean-up criteria and to

safely close out or dismantle on-site facilities.

There are three general approaches that can be taken to manage contaminated and other waste materials:

- 1) on-site management, including on-site recycling/reuse, treatment, storage or control, and thermal destruction;
- 2) removal for off-site recycling/reuse, treatment, storage or disposal; and
- 3) on-site isolation.

MOE approval of on-site management of contaminated and other waste materials may be necessary; local MOE offices can advise proponents in this regard. Materials requiring disposal must be classified and managed according to the requirements of the Environmental Protection Act (EPA) and Regulation 309 of the EPA.

Any waste left on-site that is classified as "hazardous" under Regulation 309 must either be managed in appropriately approved facilities or must be delisted according to the provisions of the Regulation and disposed of in an approved non-hazardous waste landfill. Where land has been used for the disposal of waste, application may be made to the Ministry under Section 45 of the EPA for approval of a specific proposed use of the land. This approval will only be given if the proponent can demonstrate that human health or environmental problems will not result from the proposed use.

In some cases, it may be necessary to isolate contaminants on site; this may involve fencing off contaminated areas and prohibiting disturbance of the land until additional clean-up or control measures can be taken. The mixing or dilution of contaminated materials with uncontaminated materials is not to be permitted except in exceptional circumstances and with prior written Ministry approval. A certificate of approval may be required for such activities.

Contingency plans should be developed, as necessary, in case of emergencies resulting from the remedial action. Occupa-

tional health needs should also be identified at this point in consultation with the Ministry of Labour. Any requirements for on-going environmental monitoring following the decommissioning or site clean-up should also be identified.

8.1.3 Selection of Remedial Action Technology

Technologies selected for undertaking remedial actions at a site should be those that best protect human health and the environment while meeting MOE policies and objectives and satisfying site-specific remedial requirements.

Generally, for example, approaches that include the recycling/reuse and on-site management of wastes will be preferred over other approaches, provided site-specific remedial requirements are also achieved.

8.1.4 Remedial Work Plan Approvals and Financial Assurance

Where either an MOE approval is required to complete a decommissioning or site clean-up, or an Order has been issued with respect to a decommissioning or site clean-up, the Ministry may require financial assurance to be posted by the proponent, in accordance with Part X-A of EPA. The assurance may be drawn upon by MOE to undertake any terms or conditions of an approval or Order that the proponent fails to complete.

8.1.5 Remedial Work Plan Review

The remedial work plan should be reviewed by MOE and other agencies prior to implementation to ensure that Ministry and other agency objectives will be met.

All information relating to the remedial work plan should also be made publicly available. Consideration should be given to issuing for public review drafts of any Orders or Certificates of Approval required to conduct the decommissioning or site clean-up. A notice announcing the availability of this information should be placed in all newspapers serving the community adjacent to the site to be decommissioned or cleaned-up. Public confidence in the proposed decommissioning or site clean-up may be

increased by holding an on-site "open house" where the public is introduced to the site and where the proposed plan for the decommissioning or site clean-up can be discussed.

Implementation of the remedial work plan should not begin until 30 days following the newspaper notice; in complex decommissionings or site clean-ups, or where public meetings are required to discuss the remedial work plan, a longer public review period may be required.

8.2 Implementation of Remedial Work Program

The implementation of the remedial work program requires undertaking all activities necessary to complete the plan developed above.

8.2.1 Communication With Site Personnel

Key decommissioning and site clean-up personnel and contractors should be advised by the proponent of the requirements and objectives of the Ministry, other agencies and the proponent. This will help ensure that the decommissioning or site clean-up proceeds as rapidly and efficiently as possible and will minimize the possibility that additional work will be required due to an initial failure to meet objectives.

8.2.2 Operation of Equipment and Processes

All existing pollution abatement equipment, procedures and processes required for decommissioning or site clean-up purposes must be maintained and operated in accordance with their certificates of approval or permits throughout the decommissioning or site clean-up. Depending on the decommissioning or site clean-up, it may be necessary to adjust monitoring/treatment to ensure that batch discharges are not elevated above permissible levels.

8.2.3 Removal of On-Site Facilities

The final disposition of all on-site facilities, including buildings, storage tanks, underground storage tanks, pipes and other underground facilities relating to the decommissioning or site clean-up must be addressed during the development of the remedial work plan.

Removal of these materials must be to appropriately approved facilities.

9. Phase III Activities

Phase III involves verifying that the decommissioning or site clean-up has been satisfactorily completed, establishing and maintaining monitoring systems, and communicating the completion of the decommissioning or site clean-up to all relevant agencies and groups.

9.1 Verification

Following the completion of decommissioning or site clean-up activities, the proponent must undertake a verification sampling program to establish that the objectives of the environmental aspects of the decommissioning or site clean-up have been achieved. This sampling program need not be as extensive as the Phase II sampling program, but must be sufficiently detailed to establish that satisfactory clean-up has been achieved over the whole site.

The results of the verification sampling must be made available to MOE, other agencies and the public for review. MOE will conduct its own verification sampling, as necessary, in addition to the sampling conducted by the proponent. If objectives have not been met, proponents will be required to undertake additional work necessary to meet the objectives.

9.2 On-Going Monitoring

In some cases, on-going monitoring of the site may be necessary in order to ensure that contaminant problems do not recur.

Where on-going monitoring is required, the proponent must provide for the operation, maintenance and funding of the monitoring system and must review these aspects of the system, as well as the technical adequacy of the system, with MOE. In order to ensure that on-going monitoring is properly conducted, either an approval or Order will be issued to the proponent outlining the terms under which on-going monitoring will occur. MOE will require regular on-going monitoring reports and will require additional remedial work if these reports indicate unacceptable contaminant impacts.

MOE may require the proponent to provide financial assurance in a form satisfactory to MOE, in accordance with Part X-A of EPA, to meet the

costs of on-going monitoring. The amount of such assurance will be decided by MOE according to site-specific needs. Under Section 18 of EPA, where decommissioned or cleaned-up land is sold, the new owner has assumed responsibility for maintaining the monitoring system and for any necessary future remediation, together with any outstanding financial obligations, unless the terms of the sale of the property indicate otherwise. The assumption of responsibility by a new owner does not relieve any previous owners or occupants of their responsibilities to the environment.

9.3 Communication of Completed Decommissioning

After verifying the decommissioning or site clean-up has been satisfactorily completed, all appropriate agencies should be notified of its completion. The completed decommissioning or site clean-up should also be communicated to the public and the availability of all information relating to the decommissioning or site clean-up should be announced by a notice in newspapers serving the community adjacent to the site. It may be desirable to hold an "open-house" so that all interested parties can see the completed decommissioning or site clean-up.

10. Phase IV Activities

Phase IV involves signing off the decommissioning or site clean-up. Documents registerable on the title of the property should be so registered. MOE will provide a written statement of the activities that have been undertaken during the course of the decommissioning or site clean-up and the level of clean-up achieved. Redevelopment of a site may require approval by MOE or other agencies.

10.1 Registration of Decommissioning or Site Clean-Up

Unless all contaminants have been removed to background levels, the fact that there are residual contaminants on the property should be recorded on the title to the property. One or more registerable documents may have been created as a result of the prior operations at the site or the clean up activities. These can be used for purposes of recording information on title. Where title is recorded under the Registry Act and there are no appropriate registerable documents an affidavit may be deposited on title setting out any remaining matters of concern.

The proponent should also prepare a report detailing the decommissioning or site clean-up. The report should include all details of the decommissioning, or site clean-up, which will be relevant to the subsequent use or occupation of the property, including contaminants found at the site and their concentration, contaminants remaining at the site and their concentration, and remedial and control measures taken. This report should be forwarded to the local Ministry of the Environment office and the appropriate municipal office. These actions will ensure that municipalities, developers, owners and others are aware of any potential future conflicts between proposed land-use and suitability of the property for the land-use.

MOE will require confirmation from the proponent's lawyer that these actions have been taken.

10.2 Statement of Completion of Decommissioning or Site Clean-Up

When all the above phases and tasks have been completed, as appropriate, MOE will, on request, provide a written statement outlining the activities and level of clean-up achieved at the site. This statement will indicate that it is based in large part on information supplied by the proponent and is for the proponent's own use. It in no way amounts to MOE accepting liability for any future environmental problems that may arise at the site; this rests with the property occupant and owner. The statement may contain, in outline, the nature of any initial contamination, work undertaken to clean-up and/or control contamination, the criteria used in the clean-up, and general future land uses that are appropriate for the site. A copy of the statement will be forwarded to the municipality.

10.3 Future Land Uses

Redevelopment of property that has been decommissioned or cleaned-up must be in accordance with the clean-up criteria and remedial actions applied at the site. Where the Ministry becomes aware of proposed site redevelopments that are not compatible with the clean-up criteria and remedial actions applied at the site, for example through its participation in the Official Plan review process, it will recommend the proposed redevelopment not occur until the applicant has provided sufficient information to the Ministry and the

Ministry has reviewed and determined the need for additional remedial measures at the site and such measures, if any, have been carried out.

Site redevelopment must be compatible with neighbouring land-uses. MOE and the municipality should be contacted regarding land-use compatibility policies.

APPENDIX A

MOE CRITERIA GUIDELINES TO BE USED IN DECOMMISSIONING OR CLEANING-UP SITES IN ONTARIO

The development of criteria for setting clean-up standards to be adopted at decommissioning and clean-up sites in Ontario is on-going. There are criteria guidelines for soil, surface water, ground water and air contamination.

Soils Upper Levels of Normal Data and Clean-up Guidelines

Table A-1 lists upper limits of normal concentrations in soils for a range of heavy metals. Where ambient background levels of on-site contaminants cannot be reasonably ascertained by a local sampling program, background levels can be defined according to the values in the table for the given parameters. The Phytotoxicology Section of MOE's Air Resources Branch should be contacted regarding on-going work to develop additional contaminant guidelines for upper limits of normal concentrations in soil.

TABLE A-1

Contaminant Guidelines Representing Upper Limits of Normal Concentrations in Ontario Surface Soil.

Parameter	Urban	Rural
Antimony	8	1 ²
Arsenic	20	10
Boron	15	10 ²
Cadmium	4	3,4 ¹
Chromium	50	50
Cobalt	25 ³	25
Copper	100	60
Iron (%)	3.5 ³	3.5
Lead	500	150
Magnesium (%)	-	1
Manganese	700	700,1000 ¹
Mercury	0.5	0.15
Molybdenum	3 ⁵	2 ²
Nickel	60 ³	60
Selenium	2	2
Sulphur (%)	-	0.1
Vanadium	70	70
Zinc	500	500

Notes:

¹ Where two values are shown, the first is based mainly on Southern Ontario data while the second is based on NE Region data.

² Provisional guideline estimated from range of results, pending additional data.

³ Rural results higher than urban results - urban guideline based on rural results.

⁴ For comparison with all of the above guidelines except sulphur, analyses should be conducted using an approved strong mixed-acid digestion procedure. For sulphur, analyses should be conducted using an approved combustion with either IR or titrimetric detection procedure. Contact Laboratory Services Branch of MOE for information on acceptable methods.

⁵ All units are in ppm (µg/g), dry weight, unless otherwise stated.

Tables A-2 and A-3 list soil clean-up guidelines that may be used to assist in developing clean-up criteria at sites to be decommissioned or cleaned-up. These guidelines relate predominantly to inorganic materials. Where guidelines are not given for the materials listed, or materials are not included on the list, the Phytotoxicology Section of the Air Resources Branch of the Ministry of the Environment may be able to assist the proponent in the establishment of a criteria level on a site-specific basis. As additional soil clean-up guidelines are developed or adopted for use in Ontario, particularly organics, they will be incorporated into Tables A-2 and A-3.

Soils or sediments to be disposed of as wastes should be classified according to the requirements of Regulation 309. In particular, soils or sediments with elevated levels of any parameters listed in Schedule 4 of Regulation 309 should be subjected to a leachate extraction test according to the protocol detailed in the Regulation. Under the leachate extraction test, soils will be classified in one of the waste categories defined in Regulation 309, and should be managed accordingly. The Waste Management Branch of MOE can provide methodological assistance in the sampling of soils for Regulation 309 purposes. Waste Management Branch can also advise as to appropriate disposal methods for soils with elevated levels of parameters that are not included on Schedule 4 of Regulation 309.

TABLE A-2
CLEAN-UP GUIDELINES FOR SOILS

Parameter ²	Criteria for Proposed Land Use ^{1/3}			
	Agricultural/Residential/ Parkland ⁴		Commercial/Industrial	
	Medium & Fine Textured Soils	Course Textured Soils ⁵	Medium & Fine Textured Soils	Course Textured Soils ⁶
pH (recommended range)	6-8	6-8	6-8	6-8
EC (mS/cm) ⁷	2	2	4	4
SAR ⁸	5	5	12	12
Arsenic	25	20	50	40
Cadmium	4 ^{1a}	3 ^{1a}	8 ^{1a}	6 ^{1a}
Chromium (VI)	10	8	10	8
Chromium (total)	1000	750	1000	750
Cobalt	50	40	100	80
Copper	200 ^{1b}	150 ^{1b}	300	225
Lead	500 ^{1a}	375 ^{1a}	1000 ^{1a}	750 ^{1a}
Mercury	1 ^{1a}	0.8 ^{1a}	2 ^{1a}	1.5 ^{1a}
Molybdenum	5 ^{1b}	5 ^{1b}	40	40
Nickel	200	150	200	150
Nitrogen (%)	0.5 ⁹	0.5 ⁹	0.6 ⁹	0.6 ⁹
Oil and Grease (%)	1 ⁶	1 ⁶	1 ⁶	1 ⁶
Selenium	2 ^{1b}	2 ^{1b}	10	10
Silver	25	20	50	40
Zinc	800	600	800	600

Notes:

- ¹ Clean-up guidelines recommended by the Phytotoxicology Section, Air Resources Branch, Ministry of the Environment. The guidelines are based primarily on phytotoxicity except for (^{1a}) based on human health, and (^{1b}) based on health of grazing animals.
- ² All units are in ppm (µg/g), dry weight, unless otherwise stated.
- ³ For comparison with these guidelines, analyses for metal and metalloids must be conducted using an approved strong, mixed-acid digestion procedure. Contact the Laboratory Services Branch of MOE if in doubt about acceptable methods.
- ⁴ Guidelines have been endorsed by the OMAF/MOE/MOH Sludge Utilization Committee.
- ⁵ Defined as greater than 70% sand and less than 17% organic matter.
- ⁶ Guideline given is for fresh oil; for weathered oil (min. 2 yr. exposed on site), the guideline is 2%.
- ⁷ EC = electrical conductivity (saturation extract).
- ⁸ SAR = sodium adsorption ratio.
- ⁹ If nitrogen levels exceed the guidelines, the mineralization of the soils should be evaluated. Additions of nitrogen-based fertilizer may be counter-productive.

TABLE A-3

PROVISIONAL CLEAN-UP GUIDELINES FOR SOILS

Parameter ²	Criteria for Proposed Land Use ^{1/3/4}			
	Agricultural/Residential/ Parkland		Commercial/Industrial	
	Medium & Fine Textured Soils	Course Textured Soils ⁵	Medium & Fine Textured Soils	Course Textured Soils ⁵
Antimony	25	20	50	40
Barium	1000	750	2000	1500
Beryllium	5	4	10	8
Vanadium	250	200	250	200

Notes:

¹ These guidelines are tentative: actual permissible levels of parameters in other situations may vary according to site-specific circumstances. Further information on the application of these guidelines may be obtained from the Phytotoxicology Section of Air Resources Branch, Ministry of the Environment.

² All units in ppm ($\mu\text{g/g}$), dry weight.

³ For comparison with these guidelines, analyses must be conducted using an approved strong, mixed-acid digestion procedure. Contact the Laboratory Services Branch of MOE if in doubt about acceptable method.

⁴ These provisional guidelines apply to soil of minimum pH 6.

⁵ Defined as greater than 70% sand and less than 17% organic matter.

Groundwater and Surface Water Contaminant Criteria

Objectives for groundwater and surface water in Ontario are given in "Water Management: Goals, Policies, Objectives and Implementation Procedures of the Ministry of the Environment", available from local MOE offices or from Water Resources Branch, Ministry of the Environment. This document should be used in conjunction with MOE policies on "The Incorporation of The Reasonable Use Concept Into The Groundwater Management Activities of The Ministry of The Environment" and "The Resolution of Groundwater Quality Interference Problems", which are available from local MOE offices or the Waste Management Branch of MOE.

Air Contaminant Criteria

Regulation 308 of the Environmental Protection Act governs air quality in Ontario. Schedule 1 of the Regulation provides air quality criteria. The criteria are based on a "point-of-impingement" concept. The methodology for calculating concentration at the point-of-impingement is provided in the Regulation. The Regulation is currently undergoing a public review and public consultation process that may result in changes to the current approach.

The Ministry of the Environment is continually upgrading its contaminant criteria guidelines. Decommissioning and site clean-up proponents should verify with the Ministry that the contaminant guidelines and criteria outlined in this document are current at the time of a decommissioning or site clean-up.

APPENDIX B

APPROACHES TO SAMPLING

MOE has drafted methodologies for the sampling of air, sediments, soils and lagoons. Regulations 308 details atmospheric emission sampling requirements. Sediment sampling procedures are provided in Guidelines For The Management of Dredged Material In Ontario. These documents may be obtained through local MOE offices or the Waste Management Branch of MOE. The Ministry's Waste Management Branch and Regional staff will review soil, waste pile and lagoon sampling methodologies to ensure they are acceptable.

The sampling requirements of groundwater are site-specific and depend on the nature of the contamination, the dynamics of the aquifer, and the nature of the overburden material. Proposed groundwater sampling programs should be discussed with MOE.

APPENDIX C

SELECTED PROVINCIAL ENVIRONMENTAL LEGISLATION
RELEVANT TO DECOMMISSIONING AND SITE CLEAN-UP

<u>Legislation/Regulation</u>	<u>Topic Covered</u>
Environmental Protection Act (EPA):	
Section 5	Regulated prohibitions on emissions/discharges of contaminants into the environment
Section 6	Control orders related to emissions/discharges
Section 12	Ministry notification when contamination exceeds permitted regulatory levels
Section 13	General prohibitions on emissions/discharges of contaminants that impair the environment
Section 14	Ministry notification when general impairment prohibitions are exceeded
Section 16	Minister's authority to order preventive measures
Section 17	Director's authority to order preventive measures
Section 27	Need for certificate of approval for a waste management system or a waste disposal site
Section 39	Prohibition as to deposit of waste
Section 45	Prohibition on land use of former disposal sites, including those on-site
Section 143	Enforcement of performance of things required to be done

APPENDIX C (cont'd)

<u>Legislation/Regulation</u>	<u>Topic Covered</u>
Regulation 308 under EPA	General - Air Pollution
Regulation 309 under EPA	General - Waste Management
Environmental Assessment Act (EAA):	
Section 14	Approval by Minister to proceed with an undertaking
Section 20	Effect of a decision by the Environmental Assessment Board
Section 29	Minister's authority to exempt undertakings from EAA.
Ontario Water Resources Act (OWRA):	
Section 16	Prohibition on discharge of polluting material
Section 18	Director's authority to require equipment etc. to alleviate effects of impair- ment of water quality
Section 24	Director's authority with regard to sewage works

- NOTES: 1) This table has been prepared for convenience only. For accurate reference, refer to the legislation.
- 2) Proponents should check with other agencies to establish relevant non-environmental legal requirements.

